

# **Understanding the Presence, Diet, and Habitat Attributes of River Otters (*Lontra canadensis*) on the Slocan River, British Columbia**

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## **1. Abstract**

Once prevalent in many waterways across British Columbia (BC), river otter populations have seen a decrease due to trapping, development, and pollution since the beginning of the 20<sup>th</sup> Century (Mowry et al. 2011). Although there are data available on coastal studies of river otter populations, details on river otter diet and populations in BC's West Kootenay region is largely unknown (Mackenzie 2013). During January and February of 2020, colleague Tiffany Muncaster and I surveyed sections of a 14-kilometer reach of river from Lemon Creek to the community of Winlaw, BC, to determine the presence of river otter through non-invasive observation survey techniques. I collected presence/non-detection data on latrine sites, tracks, slide sites, and sightings based on visual evidence. Signs detected along all transects included tracks, slides, dens, latrine sites, and river otter sightings. Based on findings from the surveyed areas, the Slocan River appears to be good habitat for river otters. Tracks were frequently detected along both sides of the river and a total of 10 dens were observed throughout the transects. A sighting of three river otters near the community of Appledale directly confirmed presence and further supports claims of favourable habitat characteristics present in the area.

## **2. Acknowledgements**

I would like to thank several individuals for their assistance in the completion of this research project. I would like to thank Tiffany Muncaster, my research partner and classmate, whom it has been a pleasure to work with throughout the project. I would like to thank Brenda Beckwith, the instructor of the Applied Research Project course at Selkirk College. Brenda has provided insight and support throughout the duration of the project. I would also like to thank my faculty advisor, Lui Marinelli, a wildlife biologist and instructor at Selkirk College's School of Environment & Geomatics, who has provided Tiffany and I with knowledge and assistance throughout the project.

## **3. Introduction**

North American river otters (*Lontra canadensis*) are semiaquatic mammals that inhabit aquatic and riparian ecosystems across British Columbia (BC) (Crowley et al. 2012). Prey selection of

river otters is driven by availability and seasonal change, and is primarily composed of fish and, in lesser amounts, small mammals, insects, crustaceans, birds, and snakes (Day et al. 2015).

Given their dietary preference for fish, their ideal denning sites coincide with those of habitat characteristics beneficial to fish (Crowley et al. 2012) such as along rivers, coastal shorelines, lakes, estuaries, and swamps (Mowry et al. 2011). The overlapping habitat characteristics of river otters and fish can elucidate the contributing factors that influence both these creatures.

Once prevalent in many waterways across BC, river otter populations have seen a decrease due to trapping, development, and pollution since the beginning of the 20<sup>th</sup> Century (Mowry et al. 2011). Although there are data available on coastal studies of river otter populations, details on river otter diet and populations in British Columbia's West Kootenay region is largely unknown (Mackenzie 2013). A literature review found no professional scientific studies of river otters on the Slocan or Kootenay rivers. Past studies of river otter presence on the Slocan and Kootenay rivers have shed some light on their preferred habitat and diet in this region (Maida 2011; Mackenzie 2013), but reliability of existing data is low due to these studies being student-led.

Maida (2011) surveyed different locations of the Kootenay River from Playmore Junction to the Brilliant Dam, near Castlegar, BC. He found river otter signs near Little MacPhee Creek, Glade Creek, Slocan Pools, and the outlet of the Slocan River using a combination of canoe and walking survey methods. A study by MacKenzie (2013) surveyed a 23-kilometer stretch of the Slocan River from Slocan City to Winlaw, BC. She observed most river otter signs between Slocan City and Lemon Creek, and between Perry's Bridge and Winlaw, also using a combination of canoe and walking survey methods.

In one study, river otters were used as indicators of ecosystem health (Ott and David 2004). Because there is some evidence to suggest this, I argue that more research into river otter populations in the West Kootenay region can improve our baseline understanding of ecosystem health in the area. Furthermore, since information on otter presence in the region is limited, and because there are no provincially standardized approaches to conducting presence/non-detection surveys of river otters, I have chosen to repeat selected methods of past studies of river otters on the Slocan River by Rhia MacKenzie (2013), and on the Kootenay River by Jared Maida (2011), previous students of Selkirk College's Recreation, Fish, and Wildlife Program.

## 4. Methods

### 4.1 Study Area

The study was conducted along three sections of a 14-kilometer reach of the Slocan River between Lemon Creek and Winlaw, BC (Figure 1). The Slocan River is a tributary of the Kootenay River to the south, and a part of the greater Columbia River drainage system (Monnier et al. 2019). This meandering stretch of river has variable river velocity due to log jams, large woody debris, and rock features, which has created many different types of habitat.

Anthropogenic influences including mining, logging, and construction of roads and communities have impacted crucial wildlife habitat characteristics on the Slocan River (Monnier et al 2019).

The Slocan River is located within the Interior Cedar Hemlock (ICHdw1) Biogeoclimatic Ecosystem Classification (BEC) Unit characterized by western redcedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*) (MacKillop and Ehman 2016).

### 4.2 Data Collection

With the assistance of classmate Tiffany Muncaster, I surveyed sections of a 14-kilometer reach of river from Lemon Creek to the community of Winlaw, BC, between January 12 and February 8, 2020. The primary aim of the survey was to determine the presence of river otter through non-invasive observation survey techniques.

No standardized methods for conducting river otter sign surveys in British Columbia were detected based on a review of the literature. I collected presence/non-detection data on latrine sites, tracks, slide sites, and sightings based on visual evidence. Location data was recorded in UTM coordinates with a Garmin GPS unit, and further information was recorded in a field book.

Habitat characteristics were noted upon sign discovery. At each sign I recorded habitat characteristics including distance (m) of sign from water's edge, slope of river bank (%), nearby vegetation types and species, associated land-use type divided into four general categories (anthropogenic, forested, open and parkland) and river bed substrate type, including silt and sand (<2 mm), pebble (2-64 mm), cobble (64-256 mm), or boulder (>256 mm).

Surveys were conducted using a combination of canoe and walking survey methods. Surveying by boat occurred in situations where waters were easily navigable, and the view of the shoreline

was not obscured. Where waters were not navigable, or where the shoreline view was obscured, transects occurred on foot until conditions allowed for the continuation of boat travel. All surveys took place between 8:00 and 16:00 to guarantee daylight and, therefore, adequate visibility for surveying. Necessary equipment for this portion of the study included a canoe, two vehicles, paddles, lifejackets, a GPS unit, a field clinometer, and a 50m Eslon measuring tape.

Scat samples were collected at each latrine site in separate sanitized glass jars, and then frozen for later analysis in a lab. Jars were organized with individual UTM coordinates and sample numbers.

### **4.3 Data Analysis**

The data analysis portion of the study are similar to those conducted by Rhia MacKenzie in her 2013 study. First, I compiled field data in Excel to perform analysis and note errors or gaps in data. I looked for relationships between otter sign and vegetation types, land-use types, substrate, riverbank slope, and distance to water's edge to assess preferred habitat type and typical characteristics. I used ArcMaps ArcGIS to present trends in collected data of sightings by transferring recorded GPS locations of latrine sites, dens, slides, tracks, and observed river otters onto orthophotos of the surveyed area.

Scat analysis occurred in a laboratory classroom at Selkirk College with the assistance of Selkirk College instructor Lui Marinelli. We washed and dried scat samples and used a dissecting microscope to identify prey species, to genus or family. Bone, scales, and hair are all used as principal qualifiers for identification (Gilbert and Nancekivell 1982). Scat analysis can provide useful information about river otter diet and is crucial for understanding their ecology (Gilbert and Nancekivell 1982).

## **5. Results**

Signs detected along all transects included tracks, slides, dens, latrine sites, and river otter sightings. Tracks were consistently detected along the east side of the river from Perry's Bridge to Winlaw, and were present along much of the west side of the river (figure 2). Tracks were also detected at two locations near Lemon Creek. Most slides were detected along the shorter transect near Lemon Creek, though there was one sighting between Perry's Bridge and Winlaw. A total

of ten dens and two latrine sites were detected, all of which were along the southern transects. River otters were observed on one occasion. During the last survey on February 8<sup>th</sup>, three otters were spotted near the community of Appledale, swimming north up the river.

The majority of detected tracks were in open areas, closely following the river's edge (figure 3). Of the survey's total 40 detected track signs, the mean distance to river's edge was 0.3 metres. Tracks were primarily detected in snow (95%), while few were found in silt (5%) (figure 4). Both detected latrine sites were immediately along the river's edge, and slides were found close to the river's edge (mean 0.4m), typically in open areas (80%).

Of the sign types, only tracks were detected directly in anthropogenic areas, though other otter signs were detected in close proximity to anthropogenic areas. For instance, tracks were detected within 10 metres of roads, fields, and bridges, within 20 metres of a regional park, and within 200 - 300 metres of houses (5%). No sign detections were made immediately in park areas.

Dens were typically found a couple metres from the shore (mean 2.1m), and more often found in forested areas than open areas (8 forested:2 open). On two occasions, dens were detected in groups of close proximity (<3m apart), with one group having three dens, and another having four. Dens detected in the study were often located directly under the root structures of mature trees, notably Western redcedar (*Thuja plicata*) (20%), black cottonwood (*Populus trichocarpa*) (10%), paper birch (*Betula papyrifera*) (30%), or dug into steep banks (40%), appearing to utilize nearby vegetation as cover (figure 5).

Mean bank slope percent differed for sign types. For dens, average bank slope was the steepest at 47%. Locations with tracks had the second steepest average bank slopes at 40%, followed by slides with an average bank slope of 35%.

Scat analysis yielded no results, as the collected scat appeared to be no more than sand and mud upon closer inspection.

## **6. Discussion**

The Slokan River appears to be good habitat for river otters, based on findings from the surveyed areas. Tracks were frequently detected along both sides of the river and a total of 10 dens were observed throughout the transects. A sighting of three river otters near the community of

Appledale directly confirmed presence and further supports claims of favourable habitat characteristics present in the area.

Maida (2011) found that river otters in the linked Kootenay River tended to avoid heavily populated human areas, a trend that seemed to be consistent with our findings. During our surveys, tracks were observed more often along the east side of the river which has more residential development but is still not heavily populated or frequented by humans. During the time of the survey, there was light human recreational use (e.g., fisherperson or trail user) along the river, although the area often sees use by rafters and swimmers in the warmer months. Survey areas that were associated with more frequent and consistent human use, like roads or bridges, had less observed signs of river otter, including a near absence of signs near the community of Winlaw, one of the more developmentally dense areas in the Slocan Valley. It appears that river otters require habitat that is unfrequented by humans, leading to the conclusion that conservationists and land managers alike should consider measures to conserve and protect existing available habitat in the West Kootenay region, such as limiting developments in riparian ecosystems.

Tracks were noted most frequently in open areas, which likely reflects a proportionate representation of the occurrence of open areas along the river. Tracks most closely followed the river's edge and occasionally led up permanent freshwater streams (figure 6).

The preferred den sites were often located under the root structures of mature trees, likely because the root structure provides a structurally stable living area. The same trend may suggest a preference for shade or vegetation cover. Where detected dens were dug into the riverbank, there was infrequent treed vegetation, though cover from the bank may have been utilized in these circumstances. Dens were found to have steeper associated bank slope percentages than other detected signs, which could support this claim. Additionally, root structures of large shrubs may have provided structural support to riverbank dens.

River otters are social creatures by nature (Gorman et al. 2006) and this is supported by our study. Dens were most often found in groups of close proximity which suggests the preference or need for regular social interaction. Further, the sighting of three river otters within close (<1m) proximity near the community of Appledale supports this claim.



## **7. Limitations**

Snowy weather conditions limited accuracy of results during the survey near Lemon Creek, as it began to heavily snow upon arrival to the survey area, limiting the possibility of detecting tracks or latrine sites. This likely contributed to a lack of otter sign at that location. Dangerous canoe travel conditions due to low water levels, log jams, and limited winter-time daylight prevented survey completion during one instance near Lemon Creek, and further contributed to a lack of useable data at that location.

## **8. Recommendations**

Our study in combination with studies completed by Maida in 2011 and MacKenzie in 2013 have shed some light on the impact of human development on river otter habitat in the West Kootenay region. Because river otters appear to avoid anthropogenic landscapes, I recommend land managers and conservationists alike take this into consideration prior to developing near or in riparian ecosystems that may provide habitat to river otters, or likewise keep existing areas protected from such developments.

Because there are currently no provincial standards for surveys of river otters in British Columbia, I suggest the implementation of a standardized approach for surveying river otter populations. This would allow for higher confidence when comparing studies.

Further data collection could improve general understanding of river otter ecology along the Slocan River. Our study did not successfully identify river otter scat, and there is still a lack of data available on river otter diet in the West Kootenay region. By collecting more data on river otter scat and its contents, we can improve our understanding of river otter diet and ecology in the West Kootenay region, allowing conservation efforts to spent more effectively.

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## Appendices



**FIGURE 1. STUDY AREA LOCATED BETWEEN LEMON CREEK AND VALLICAN, BRITISH COLUMBIA, NOVEMBER 16, 2019 (GOOGLE EARTH YEAR).**



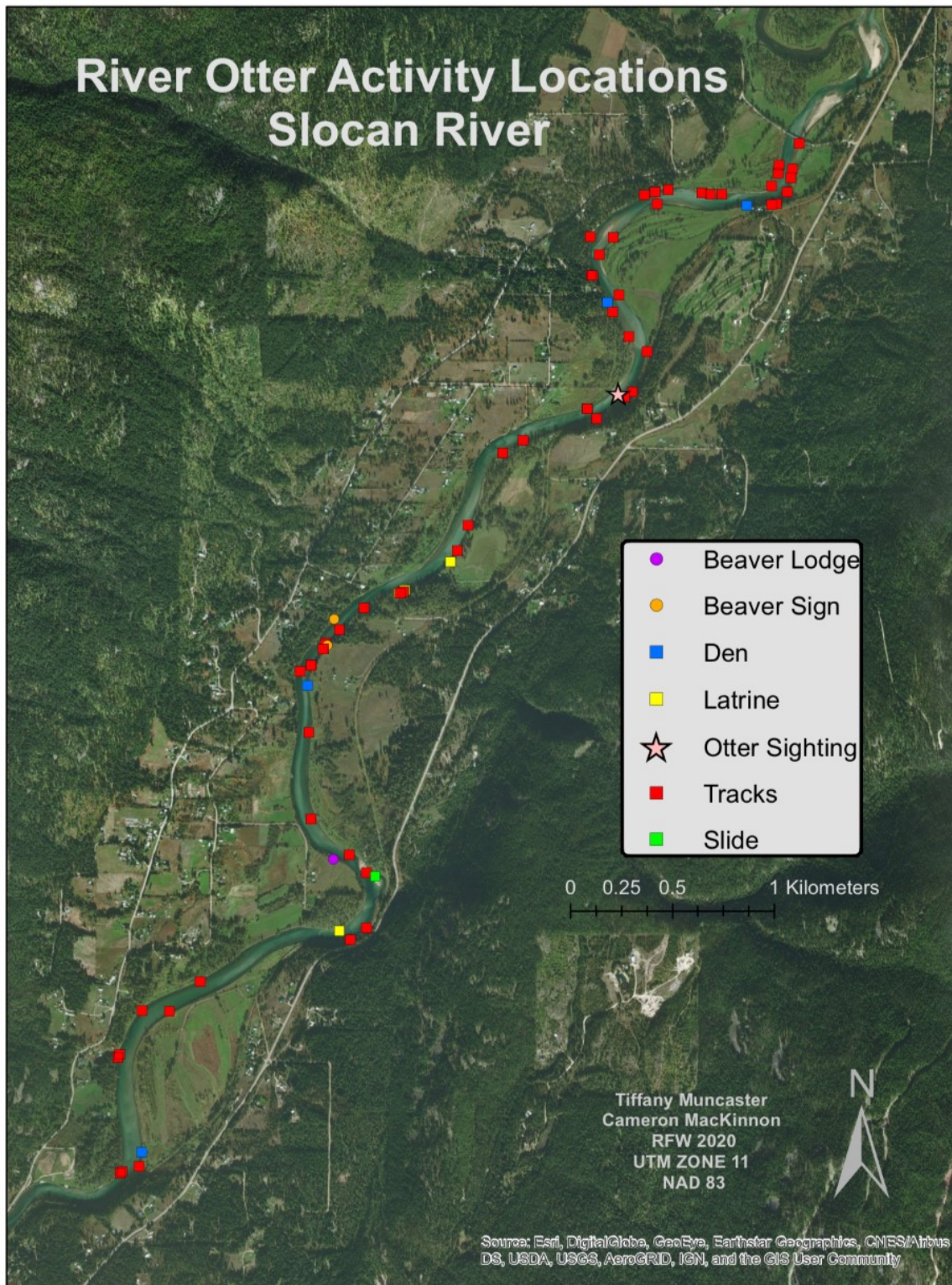
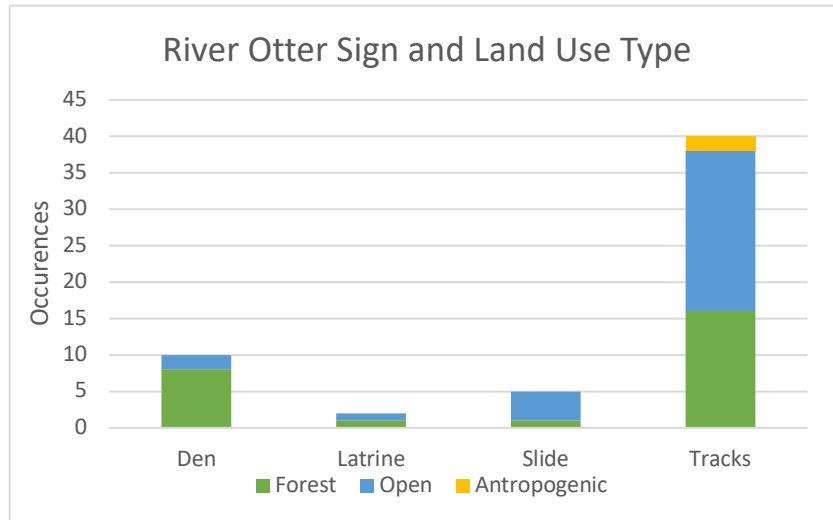


FIGURE 2. DETECTED RIVER OTTER AND BEAVER SIGNS OF SLOCAN RIVER, BC, JAN 2020 - FEB 2020.



**FIGURE 3. RIVER OTTER SIGN AND LAND USE TYPE ON THE SLOCAN RIVER, BC, JAN 14, JAN 24 AND FEB 8, 2020.**



**FIGURE 4. RIVER OTTER TRACKS IN A SNOWY SUBSTRATE, SLOCAN RIVER, BC, JANUARY 2020.**





**FIGURE 5. PICTURE OF A RIVER OTTER DEN UNDER A WESTERN REDCEDAR TREE, SLOCAN RIVER, BC, JANUARY 2020.**



**FIGURE 1. RIVER OTTER TRACKS LEADING UP A FROZEN PERMANENT STREAM, SLOCAN RIVER, BC, JANUARY 2020.**